mation between computer system **200** and computer operator (s). Another type of user input device is cursor control device **223**, such as a conventional mouse, touch mouse, trackball, a finger or other type of cursor for communicating information between system **200** and user(s). Communication device **225** is coupled to bus **211** for accessing information from remote computers or servers, such as server **104** or other computers, through wide-area network. Communication device **225** may include a modem or a wireless network interface device, or other similar devices that facilitate communication between computer **200** and the network.

[0060] FIG. **3** is a side-view block diagram illustrating a structure of a flexible displaying device **300** having multiple layers in accordance with one embodiment of the present invention. Flexible displaying device **300** includes a flexible touch sensitive surface **302**, a first flexible actuator layer **304**, a flexible display **306**, a second flexible actuator layer **308**, and a flexible circuitry layer **310**. It should be noted that the thickness of each layer is not drawn to scale. Flexible touch sensitive surface **302**, which is deposited over flexible display **306**, is capable of receiving inputs from a user. Flexible touch sensitive surface **302**, in one embodiment, is substantially transparent thereby the contents displayed by flexible display **306** can be viewed through flexible touch sensitive surface **302**. As discussed earlier, flexible touch sensitive surface **302** is divided into multiple regions, wherein each region is configured to represent a specific function. For example, if a displaying image shown behind a region is a symbol of "quit", the current application is terminated if the region showing the "quit" symbol is touched. In an alternative embodiment, flexible touch sensitive surface **302**, first flexible actuator layer **304**, flexible display **306**, second flexible actuator layer **308**, and/or flexible circuitry layer **310** are combined and/or integrated into a single flexible touch sensitive display device.

[0061] Flexible actuator layer **304**, in one embodiment, is placed between flexible touch sensitive surface **302** and flexible display **306** for generating haptic feedback. As mentioned earlier, flexible actuator layer **304** can be composed of EAPs, piezoelectric elements, and/or SMA. For example, thin strips of piezoceramic (or piezoelectric), SMA, and/or EAP may be interlaced with flexible display **306** or flexible touch sensitive surface **302** or both for creating haptic sensation. The strips of flexible actuator can either be made in a layer or multiple individual strips. Alternatively, the strips could be placed on the back side of flexible display **306** as flexible actuator layer **308**. It should be noted that flexible actuator layer **308** and flexible actuator layer **304** can be substantially the same layer. Alternatively, one of flexible actuator layers **304** and **308** may be required in flexible display device **300**. If the strips are anchored at several places on flexible display **306**, the strips would create a vibration when they are activated. A single or multiple strips may be used to vibrate entire flexible display **306**.

[0062] Flexible display **306** can either be a rollable display, a foldable display, or a bendable display. Flexible display **306**, also known as an electronic paper, an e-paper, a digital paper, an electronic ink, electronic reusable paper, or a power paper, is capable of displaying images and capable of maintaining the images with limited power consumption. It should be noted that the physical property of flexibility of flexible display **306**, flexible touch sensitive surface **302**, and flexible circuitry layer **310** are substantially similar thereby they can be folded, rolled, or bent at the substantially same rate.

[0063] Flexible circuitry layer **310** includes various processing and computing components as discussed in FIG. **2**. In one embodiment, upon receipt of input from flexible touch sensitive surface **302**, flexible circuitry **310** receives the input signal via connection **324**. Flexible circuitry **310** processes the input information and initiates haptic feedback in response to the input information via connection **320**. Flexible display **306** receives image information for displaying from flexible circuitry **310** via connection **322**. It should be noted that flexible display device **300** may contain other layers but they are not necessary to understand the present invention.

[0064] FIG. **4** illustrates a thin strip of flexible actuator **402** attached to a flexible display **400** in accordance with one embodiment of the present invention. The thin strip of flexible actuator **402** may be a strip of piezoelectric element or a fiber of SMA or EAP. In one embodiment, the fibers are very fine and they are almost invisible. Alternatively, the fibers can be made by the materials almost transparent or clear thereby the image from the flexible display can penetrate the fibers or a fiber layer.

[0065] Fiber **402** expands and contracts depending on the voltage applied. In one embodiment, when fiber **402** is activated, the entire screen vibrates. For example, the similar actuator materials can be used to local deform or bend the entire flexible screen. A fiber of SMA, for instance, decreases in length when it is activated. If an SMA fiber **402** is attached to both ends of display **400**, fiber **402** can pull both ends of the flexible display **400** together and consequently flexible display **400** bows as shown bent flexible display **404**. Depending on the amount of actuation the bowing can be macroscopic or perceived as a vibration.

[0066] FIG. **5** illustrates an alternative embodiment of a flexible display device **500** having flexible actuators in accordance with one embodiment of the present invention. Flexible display device **500** includes multiple strips (or fibers) of flexible actuators **510-514**, which could be piezoelectric elements, SMA fibers, EAP nanotubes, or a combination of piezoelectric elements, SMA and EAP fibers. Each of multiple fibers **510-514** anchors (or attaches) at a different point of flexible display **504**, and consequently, each of multiple fibers **510-514** delivers a unique vibrating function. For example, when fiber **514** shrinks (or contracts) due to the application of voltage, the middle portion of flexible display **504** starts to buckle (or warp). On the other hand, when fiber **512** shrinks, a portion of flexible display **504** buckles and causes various vibrations. The edge of flexible display **504** buckles when fiber **510** is activated. It should be noted that various different patterns of fibers can be anchored to flexible display **504** to achieve different haptic sensation.

[0067] Flexible display device **502** illustrates an alternative layout of various fibers to achieve the same or similar haptic sensations or feedback. Various fibers **522** are anchored along the edge of flexible display **506** and the advantage of this layout is to reduce the interference of image displayed in a display window **520**. A unique fiber **522** or a combination of fibers **522** may be activated to generate a predefined haptic feedback. It should be noted that other types of layouts are available such as mesh design to achieve specific haptic feedback sensation.

[0068] The present invention includes various processing steps, which will be described below. The steps of the present invention may be embodied in machine or computer executable instructions. The instructions can be used to cause a